TOWARD AN AGENDA FOR THE FUTURE

OLD DIRECTIONS, NEW DIRECTIONS: CONCLUDING REMARKS

Norman M. Bradburn
NORC

I have been asked to take on the unenviable task of giving an overview of the last two days and, on the basis of that overview, to give some thoughts on future directions. In order to have some empirical idea of what the directions--new or old--have been, I looked at the topics covered in this symposium and compared them with the topics covered in the first symposium four years ago.

If we view the programs of the conferences as unobtrusive measures of what are the central research directions in statistical methodology, at least in the minds of the organizers of these conferences, we can get an idea of how things have changed in the last four years. For comparison, I coded the session topics into four themes: 1) conceptualization of statistical measures--that is, what we are measuring; 2) design and analysis of statistical surveys; 3) operational issues in data collection; and 4) dissemination of data to users. The result of the comparison is seen in Table 1.

Table 1

Themes of Papers Given at 1990 and 1994 Seminars

	1990	1994
Conceptualization	0	1
Design/Analysis	5	4
Operations	6	5
Dissemination/Use	1	2
Total	12	12

Six (or seven) of the 12 sessions in each year are on the same topics. They are: 1) Administrative Records, 2) Longitudinal Surveys, 3) Data Editing, 4) Disclosure Limitation, 5) Computer Assisted Data Collection, 6) Cognitive Testing of Questions. The seventh, Incomplete Surveys, could be considered at least partially the same topic, i.e., Coverage Problems in 1990 and Non-Response in 1994.

Without looking at the new topics, one might view this as little change; but when we look at the particulars of those new topics, it seems clear that there are major shifts in direction. New session topics were: 1) Customer Surveys, 2) Respondent

Incentives, 3) Small Area Estimation, 4) Time Series revisions, and 5) Economic Classification Revision.

What is it about the new topics that leads me to think we are moving along some significant new directions? I see the primary theme of these new topics as the need to rethink some old problems in order to cope with three types of change: 1) changes in social conditions, 2) growth in demand for data and 3) technological change. Let me comment on these in turn.

1. **Changes in social conditions.** Society is becoming more diverse along many lines. It is not just the increasing cultural diversity that is so much remarked upon but also the increasing diversity in household structures, in a changing occupational structure, and in the globalization of the economy. Our traditional ways of collecting data and the statistical categories we have used are creaking and in need of revision. Surveys are harder to carry out, so we become concerned about questionnaire development and incentives for respondents. It is even necessary to rethink how we conduct the decennial census. Our classification schemes for economic and social categories are no longer adequate, so we rethink the SIC and SOC and the problems of revising time series when you change the measuring instruments.

2. **Growth in demand.** It is a truism these days that we live in an information society. The demand for data grows apace with the proposals for health care reform and the health data network and the increasing demand for evaluation of social services and social programs. Concern for international economic competitiveness leads us to rethink the categories we use to collect economic statistics, such as how we measure the trade balance and what industrial and occupational classification scheme we use. It is important to have an economic statistical system that is consonant with that of other countries.

There are two implications for statistical methodology of this increase in demand for data. The first is that it requires a strong customer orientation to be responsive to the changes in demand. We need to know what the consumers of statistical information require in order to carry out their work efficiently. Second, because of the high cost of data collection in a world of tight budgets, we need to develop alternative ways of doing things--not just tinkering around the edges, but some fundamental changes ("reengineering," to use the current buzz word).

3. **Technological change.** CATI, CAPI, CASI, Audio-CASI. computer-assisted everything. The ability to handle large data files cheaply has changed the economics of data analysis, if not of data collection. Data are accessible on Internet; you can call in for SIPP data. All of these advances whet the appetite for more data--more quantitatively, in more detail, and more easily accessible.

At the same time, increased availability of large data sets increases the risk of disclosure of data that compromises the privacy and confidentiality promised to respondents and upon which our ability to get accurate data depends. Confidence in the statistical system must be maintained, and that means preventing disclosure on individually identifiable data for non-statistical purposes. Hence our renewed concern for data disclosure limitation principles and methods.

Where does all this change lead us? First, I think it leads us to a fundamental rethinking of some of our major data systems. We have already seen the revision of the CPS. We have heard here about proposed revisions in the Standard Industrial Classification system and the Standard Occupational Classification. These are truly major changes in our statistical thinking.

Work has begun on a revision of the CPI. We are rethinking the way we conduct the census. Dare we think of an administrative records enumeration in 2010 with the long form data supplied by continuous measurement? Can the national accounts be recast to include supplemental accounts for the environment (so-called Green Accounting) and recast for other non-market sectors as well? Will data bases become public utilities that can be used for many purposes? For example, the basic health care file, if it were to come to pass, could be a prime source of data for an administrative records census or a data base for assessing the outcomes of health care services. A Master Address File that was available to everyone, the Census Bureau, the Post Office, state and local governments, the private sector, would be a true common good.

A final theme that cuts across all of our sessions here is that we must take a more international perspective. We can learn from other countries that have been confronting some of the same problems. There is also increased pressure to have consistent statistical measures across the developed countries at least, so that international comparisons can be made.

The spur of competition can be good. The State governors adopted a set of Educational Goals for the year 2000. One of these is for the United States to be first in science and math education by the year 2000. In the Economist magazine's annual rankings of governmental statistical systems, the United States has ranked about 5th for the last few years. Perhaps we should take as our goal to replace Statistics Canada as first in the world among statistical systems by the year 2000.

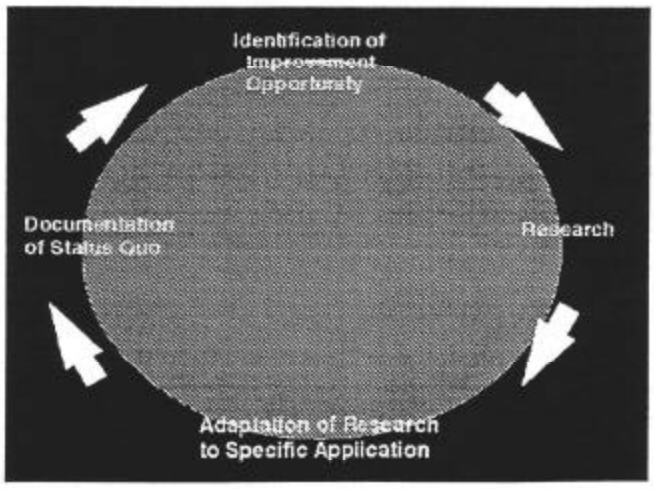
Future directions? From what we've heard here, we may not be able to know precisely how to proceed, but we will have to move forward with an international perspective, a willingness to rethink our methods, our tools, and our purposes.

Toward an Agenda for the Future

Robert M. Groves
University of Michigan and Joint Program in Survey Methodology

It is obvious that the rate of change of the society and economy being measured by statistical agencies is increasing. We have only to observe the ubiquity of merger, acquisitions, and turnover of firms, partly a reflection of the ongoing creation of novel combinations of services and goods. In the demographic domain, we are faced new living arrangements, nontraditional household definitions, and homelessness at levels of occurrence that challenge traditional methods of measurement. It now seems clear that the rate of change of social and economic measurement systems needs to approximate that in the society. We have heard over the last two days much evidence of this.

Figure 1 is a version of charts that are popular among those in the quality movement. It is used to describe the process of continuous improvement key to that philosophy. As "reinvention," "restructuring," "re-engineering," "customer orientation," "total quality management," and related concepts make their way into statistical agencies, it might be useful to reflect how the technical research and development presented over the last two days relate to the process described in such a chart.



The process begins, even prior to the contents of this chart, with the identification of customer needs and desires. Given that as a basis, first the organization needs to document what it does and how the processes of the organization are now conducted. This documentation leads to identification of potential areas of improvement, "identification of improvement opportunity." Whether the process can or cannot be improved is a matter to be resolved in a "research" step. Then the results of the research are applied in "adaptation of research to specific application." At this point, the process begins again, this time with the production process operating at a higher level of overall efficiency, but still subject to improvement.

One aspect that differentiates research in government statistical agencies from research in academia is the last step, application of research findings in practical settings. This fact is accompanied by organizational roles that perform these activities in conjunction with the researcher. The researcher is joined by a manager, who is charged with the responsibility of directing the processes undergoing change.

It's useful to review each of the four steps from the vantage point of a program manager of a data series and a researcher or scientist, both located in a government statistical agency.

Documentation

Documentation is often viewed as the bane of those who develop and conduct data collection, processing, and estimation programs. It is most often not done (or not done completely) for many statistical series. When done, it is often done long after the introduction of a new process, and then completed by someone who was not part of the creation of the process. The lack of good documentation on design, processing, and estimation features of statistical series can be a nontrivial impediment to their improvement. For example, when there is clear evidence that a process is not performing as desired (e.g., nonresponse rates too high, edit processes yielding contradictory data), improvement is often delayed by lack of clear documentation of exactly what is being done. When lack of documentation is joined by high turnover among staff and computer based systems, it is often the case that workers implementing a computer-based process truly don't know what they are doing.

From the management perspective, documentation allows knowledge of what processes are the staff are performing. It permits the manager to look for opportunities to streamline processes, combining steps and improving flow. For the researcher or scientist, documentation is the equivalent of gathering observations about possible causes of outcome variables. It is the inductive part of the scientific method -- assembling information that suggest hypotheses for sources of weaknesses (and thereby opportunities for improvement).

Why is documentation an important step in the process of continuous improvement? Improvements on undocumented systems are limited to those performing the *status quo* activities because only they know what is being done. This limits the set of persons who can be called upon for suggestions for improvement. This limitation is exacerbated in organizations where staff implementing programs do not have rudimentary testing and experimentation skills. It seems clear that without documentation of best practice,

agencies can't get to "the cutting edge" that the benchmarking aspect of the quality movement espouses.

Opportunities for Improvement

The use of Pareto curves prompts managers to focus on the problems that are causing the greatest loss of quality or efficiency in production. This is a vehicle to reallocate budgets to save money on expensive processes by investing money in design and retooling phases. Given most government budget systems, an investment in a research and development project to improve one component of a statistical series generally means that some other components will incurred reduced funding. The manager needs the courage of his/her convictions that such an investment can lead to cost efficiencies at a later point.

For the scientist the "identification of improvement opportunities" step often also means a search for experiments on design features common to many surveys. Often important weaknesses of one statistical series are shared by other statistical series. If the researcher can identify such cross-series problems, then single research projects can offer improvements to several data series at once.

In one sense, this seminar can fulfill a similar function. If one agency discovers improvements that are applicable to the work of another, significant research savings are possible.

Research

The research step from the management perspective is a search for independent evidence that change involving risk was well-founded. The research step tests some model of the real change in the production system. To the extent that the research step perfectly mimics the real production setting, the inference from the experiment will apply to the production process. In this sense, research is a risk reduction tool for the manager. Change without research runs higher risks of no improvement or even loss of quality in statistical series.

For the scientist, only experimentation offers the proper grounding for application of some discovery. The scientific method underscores the need for explicit contrast under similar conditions of the new process with the old, before recommendations about change can be well-founded. Much research in social and economic statistics is "applied," with its findings relevant to ongoing statistical series. Applied research is the type most often practice in statistical agencies (and reported in conferences like this one). The cheapest research (in the long run) is theory-driven, often motivated by basic research. This is the research that offers solutions for large sets of surveys and census operations. Choosing the right blend of support for basic and applied research in government agencies takes great wisdom. One without the other is vacuous.

Adaptation of Research to Specific Application

This step is typically the focal point for program managers. From the standard managerial perspective, the real work (and associated risks) of change begin here.

The issues of concern to the manager always concern whether the costs of the change are smaller than the benefits. Sometimes real courage on managers' parts is required in organizational cultures where failed change is punished by withdrawal of the support of superiors.

From the scientific perspective, this step typically requires speculation about the inferential limitations of the research into alternative solutions. Scientists are generally well-trained in hypothesis generation, but not particularly well-schooled in decision-making with imperfect information. In the world of statistical agency programs, there is rarely or never perfect information. Indeed, in any application of a scientific discovery there is some inferential leap that goes beyond the research. Many scientists are uncomfortable with such leap, but scientists in statistical agencies, to be responsive and useful to their agencies, must develop these skills. Clearly, this is most easily accomplished when they work in partnership with their colleagues on the program side.

All of the steps in Figure 1 are difficult, but this step seems most fraught with difficulties and failure to communicate between the managerial and the scientific cultures within statistical agencies.

Implications for Future Symposia, the Working Paper Series, the System

What do these observations have to do with a symposium like the one we have all just experienced? Let's examine the content of this symposium. There was clearly more attention on documentation and adaptation of research to applications, than on methods used to identify opportunities for improvement in data series, or in the findings of more basic research. This is an appropriate mix, I believe, for the purposes of the conference -- an attempt to disseminate new developments of applied utility.

Given that focus, future symposium might reconsider the format of a scientific conference, where a researcher presents his/her work and a discussant critiques the scientific merits of the work. Perhaps for the purposes of application of new discoveries, workshops and didactic seminars might be more useful.

One method of doing that is to use the Federal Committee on Statistical Methodology to identify agencies using "best" practices in various components of statistical work, and to encourage them to mount such workshops, perhaps with some collaboration with scientists and practitioners outside the Federal statistical system.

It is clear that the Federal statistical system can profit from the successes of integrating science and management, of adapting research discoveries to practice that exist in some agencies, but need to be spread more widely across all agencies. What the system does not need is more papers assessing ideas alone. It does need more papers describing how new ideas were assessed, molded to a specific problem, and systems changed to incorporate them. Problems of statistical system are not solved by ideas alone, but by ideas implemented to produce innovation in data series. Presentations in future symposia might be collaborations of program managers and scientific staff, addressing the four steps of Figure 1 for a specific survey or set of statistical activities, from their two

different perspectives.

I feel more strongly that the symposium should continue annually, than that it should take on a particular format or offer particular content. Regardless of its format, it is a gathering of the clan within the statistical system, allowing them to meet and converse with one another, to compare techniques, to try out new ideas removed from their organizational cultures, to renew their commitments to improved quality in statistical activities. This will always have value.

TOWARD AN AGENDA FOR THE FUTURE

Katherine K. Wallman
Office of Management and Budget

Over the past two days, we have heard many ideas and suggestions for how we can build upon and improve the efforts we are undertaking through the Federal Committee on Statistical Methodology (FCSM). The "new directions in statistical methodology" we might pursue range from updating and expanding our technical contributions to broadening and deepening the understanding and application of our work. Underlying all of the proposals are two fundamental and, I believe, shared perceptions: first, that the FCSM's activities to date have been of considerable value, and second, that there are opportunities we should pursue to further the FCSM's goal of improving the quality of data produced by the Federal statistical system for our community of users within and outside the government.

In his keynote address for this seminar, Graham Kalton reminded us of the four functions for the FCSM that Margaret Martin outlined at our 1990 Seminar on the Quality of Federal Data. These functions do indeed serve as a useful framework for considering the committee's future agenda, and I would like to return to them in highlighting in particular a few of the suggestions that have been made for ways we might broaden and deepen the understanding and application of the FCSM's work.

The first of these functions is the exchange of knowledge, techniques, and experience among committee members. As has been noted, the members of the Federal statistical community who serve on the FCSM and its subcommittees often carve out time for these activities from their already overly full calendars. The result may well be that they must focus rather narrowly on the task at hand and may forego the opportunity for more informal dialogue. We need to think of ways to give these professionals "permission" to engage in less structured conversation. As a first step, the leaders of the statistical agencies should be encouraged to view the work of the FCSM as a priority for their staff members. In part, we may be able to address this matter by familiarizing the agency leaders more fully with the committee's products.

The second function outlined for the FCSM is the provision of "state of the art" reports to encourage best practice among a broader group. With respect to the "state of the art" aspect of the committee's work, I think there is some considerable agreement that while an FCSM report may meet this challenge when it is issued, in some cases the art is changing so quickly that a working paper may become if not obsolete at least outdated more rapidly than we would hope. Perhaps we should consider new forms of publication -- "loose leaf" printed versions and/or electronic versions that could have sections updated, rather than waiting

several years to revise the entire paper. The challenge of sharing our work with a broader group is key. On the one hand, as Graham Kalton elaborated, we need to reach out beyond our Federal walls in developing our working papers to capitalize on the expertise resident in the private sector, foreign governments, and other arenas. His remarks provide a number of useful suggestions the FCSM should pursue. On the other hand, it is absolutely essential that we continue to strengthen efforts that have been undertaken to disseminate the FCSM's products far more widely, both within and outside the Federal Government. This means not only distributing our product to additional audiences, but also extending the seminars, workshops, and other forums where the subject matter of the papers can be explored in greater detail and become more useful to those less familiar with the content.

In terms of the third function suggested by Margaret Martin, recommending areas for improvement and needed directions for research, once again the need for greater outreach has been highlighted, and some useful paths to pursue have been suggested. At the same time, we need to take some care in reaching out that we do not ask the FCSM to be "all things to all people." As has been noted, the members' plates are quite full already, and we should not overload them. Yet there should be new ways to meet reasonable demands, and we as a community should put some of our energy into brainstorming about alternative ways of operating to address these needs.

The consensus building role suggested as a fourth function for the FCSM is surely an area where the committee can make a contribution. In my view, however, to suggest that the FCSM should be responsible for obtaining consensus on issues such as definitions, concepts, and classifications moves us to an arena that is beyond its mandate. Many of these activities involve domains of expertise beyond the specialties of the FCSM membership, as well as exceptionally labor intensive tasks. Through the cooperation of the statistical agencies and other relevant components of the Federal Government, we are pursuing a number of these challenges. We would welcome the suggestions for further work in this area that might arise as a result of the FCSM's deliberations.

In closing, let me note our appreciation to the Council of Professional Associations on Federal Statistics for bringing us together once again, to the session organizers and presenters for their substantial contributions to the success of this seminar, and last but not least to the members of the FCSM and its devoted leader Maria Gonzalez. We look forward to planning an encore to be held in 1996.

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